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TWO MANTIS SHRIMPS NEW TO THE AUSTRALIAN FAUNA (CRUSTACEA:STOMATOPODA:BATHYSQUILLIDAE)

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ABSTRACT

Two deep-sea mantis shrimps, *Bathysquilla crassispinosa* (Fukuda) and *B. microps* (Manning), are reported for the first time from Australian Seas, from about 350m and 1000m depths respectively in the Coral Sea. The morphology of the specimens is described and illustrated and the relationships and zoogeography of the family Bathysquillidae are discussed.

KEYWORDS: Crustacea, Stomatopoda, Bathysquillidae, zoogeography, Australia.

INTRODUCTION

The little known deep-water stomatopod family Bathysquillidae contains only four species in three genera. Of these, only one has been previously recorded from Australian waters. *Altosquilla soelae* Bruce, has been found to occur in some numbers on the northwest shelf region of Western Australia (Bruce 1985). Recent surveys carried out by the research vessels of the Commonwealth Scientific and Industrial Research Organisation, the F.R.V. 'Soela' and the R.V. "Franklin," off the coast of Queensland, have recently collected three specimens of two species of the genus *Bathysquilla* Manning.

SYSTEMATICS

Superfamily Bathysquilloidea Manning, 1967

Family Bathysquillidae Manning, 1967

Genus *Bathysquilla* Manning, 1963

Bathysquilla crassispinosa (Fukuda)

(Figs 1 A-C, 2,3 A-H, 4A, 5, Frontispiece A)

Lysiosquilla crassispinosa Fukuda, 1909:61, Pl. 5 Fig. H; 1910: 146-149, Pl. 4, Figs 4, 4a; Gordon 1929: 462, Figs 1-2; Barnard 1950:859-860, Fig. 3b.

Bathysquilla crassispinosa — Manning 1969: 95, 98; Ingle and Merrett 1971: 197; Manning and Struhsaker 1976: 440-443, Figs 1 a-c, 2; Bruce 1985: 474-475, Fig. 4b; Moosa 1985 (1986): 371, Pl. 1 A-B.

Material. 1 ♂, 1 ♀, NTM CR. 006298, F.V. *'Soela'*, Cruise 0685, stn. 11, 20° 59.15'S 152° 58.55'E, 343-350m, trawl '18 xi 1985, coll. T. Ward and A.J. Bruce.

Description. The following are additions to the previously published data.

In profile, rostrum sigmoid with tip ventrally convex, slightly upturned.

Mandible (♂, left) with stout corpus, palp 3 segmented, segments slender, sparsely setose, lengths in ratio 15:18.5:12, incisor process robust, with teeth feebly divided into distal group of 3 larger teeth and proximal group of 5 smaller teeth, molar process narrow, tapering, with upper row of 8 blunt marginal teeth, lower with row of 9. Maxillula with short, blunt, recurved, sparsely setose palp; distal endite short, tapering, with stout terminal spine, with 2 smaller spines dorsally and 4 spiniform setae; proximal endite distally broad, truncate, with 3 transverse rows of short, simple spines. Maxilla 5 segmented, proximal segment with oval endite, antepenultimate segment with bilobed endite, distal endite larger than proximal, penultimate segment with broad simple endite and terminal segment elongate, with simple oval endite, medial margins of endites all densely setose, lateral margins of proximal segments more sparsely setose.

First maxilliped slender, chela with palm compressed, subrectangular, 2.0 times longer than deep, with dactyl about 0.3 of palm length, stout, moderately curved, ventrally concave, with small tuft of simple setae at about 0.3 of dorsal length, distoventral

angle of palm rounded, with low raised carina bearing row of about 16 short spines, with one larger spine proximally, densely setose medially and laterally, setae simple, distoventral angle of palm with 3 stout spines, distal half of spine spatulate, with strong acute marginal dentations (Fig. 3B), ventral margin of palm densely setose, setae shorter proximally, longer distally, strongly flattened, anterior margin with palisade of small truncated denticulations, except at tip, posteromedial and posterolateral surfaces densely covered with microspinules, tip feebly bilobed, with small pore, dorsal margin of propod with numerous long slender simple setae distally, distomedially and distolaterally; chela articulated with propod in line of longitudinal axes.

Second maxilliped with dactyls bearing 11-10 teeth in both sexes, the proximal teeth on the left side in each specimen very small, all larger teeth except terminal finely obliquely milled distally, non-serrate; propodus with acute distoventral angle, occlusal surface with four long mobile spines proximally, lateral cutting edge with row of numerous small acute fixed teeth, not forming palisade, medial cutting edge with 9 and 10 long slender fixed perpendicular spines in male and female respectively, medial and lateral margins separated by narrow groove with depressions at intervals to oppose tips of dactylar teeth; carpus with two strong dorsal teeth, small fixed ventral tooth in male, short mobile spine in female.

Third maxilliped with large subchela, palm about 1.6 times longer than width, with 3 strong mobile spines proximoventrally, cutting edge with about 17 short fixed spines laterally, 3 isolated fixed spines medially, dactyl stout, curved, extending to proximal ventral propodal spine, dorsal surface with dense longitudinal row of setae; carpus with 5 strong mobile ventral spines; propod and carpus with long and short rows of long setae ventrally and along dorsal margin propod.

Fourth maxilliped similar to third, subchela slightly smaller and less robust, ventral propod with 3 large mobile spines proximally, ventral carpus with 3, propod cutting edge with about 19 short fixed spines laterally, 3 isolated mobile spines medially.

Fifth maxilliped similar to fourth, distinctly smaller, ventral propod with 3 mobile spines proximally, ventral carpus with 3; propod cutting edge with about 7 short, fixed spines laterally, 3 isolated spines medially.

Sixth thoracopod with short, curved, 2-segmented protopodite, coxopodite about 3.0 times longer than central width; basipodite short, about 0.3 of coxopodite length; longer ramus with proximal segment 3 times longer than distal width, subcylindrical, moderately expanded distally, with distolateral tuft of spiniform setae, long plumose setae along distal medial margin; distal segment compressed, about 0.7 of proximal segment length, expanded centrally, tapering distally to rounded tip, about 3.5 times longer than greatest width, medial margin glabrous, distolateral border with thick brush of long setae, finely and densely setulose, numerous, long flexible spiniform setae proximally; shorter ramus with proximal segment about 0.2 of coxopodite length, sparsely setose, subcylindrical, distal segment compressed, about 2.1 times proximal segment length, slightly broadened distally and rounded lateral border with few minute setae, inner margin with fringe of longer, feebly plumose setae. Seventh and eight thoracopods similar.

Endopodite of ♂ first pleopod 2 segmented; proximal segment medially robust, laterally membranous; distal segment with short robust appendix interna proximally, elongated, semitubular appendix masculina with medial flange, and recurved anterior uncinate process.

Receptaculum seminis on ♀ sixth thoracic sternite with well developed thick triangular median plate, apex swollen, smooth, about 2.0 times longer than wide, small median transverse plate posteriorly with pair of feebly sigmoid subcylindrical submedian processes, about 7.0 times longer than central width, strongly divergent, ventral surface strongly calcified, posteromedial surface membranous.

Genital papillae of ♂ elongate, subcylindrical, rigid, about 0.75 of eighth thoracic coxal segment length.

Measurements. See Table 1.

Colouration. General body colour pale orange-red, palest on carapace, becoming more intense posteriorly to sixth abdominal segment; telson with median carina and margins orange-red, central portions greyish, carpus and distal merus of second maxilliped orange-red, distal dactyl feebly orange-red,

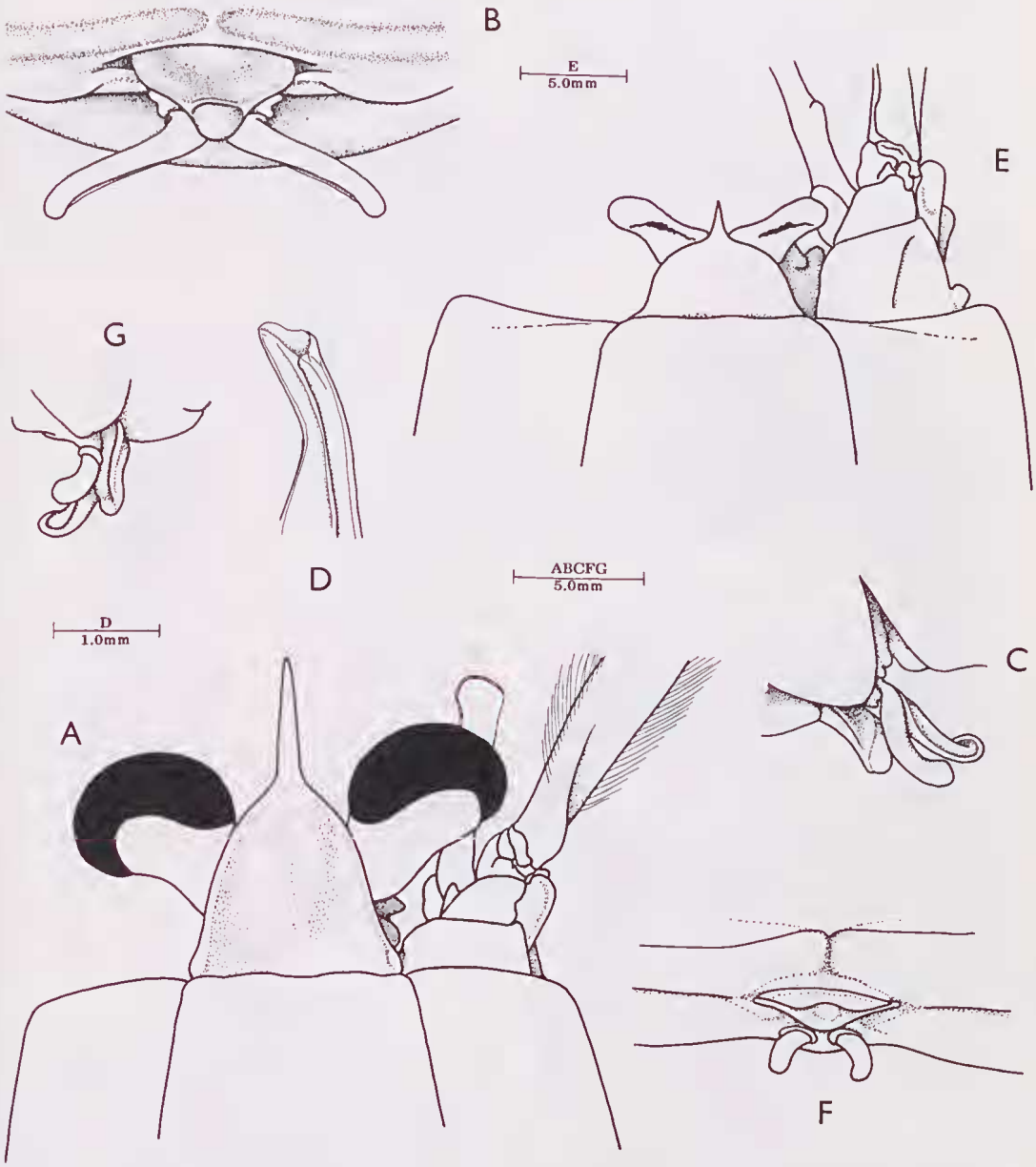

Fig. 1. *Bathysquilla* spp. ♀ : **A-D**, *B. crassipinosa* — **A**, anterior carapace, rostrum, eyes, antennal pedunele; **B**, sixth thoracie sternite; **C**, samc, lateral view; **D**, tip of appendix masculina, medial aspect. **E-G**, *B. microps* — ♀ . **E**, anterior carapace, rostrum, eyes, antennal peduncle; **F**, sixth thoracic sternite; **G**, same, lateral.

spines white, propod mainly white, scaphocerite, 6-8th thoracic limbs, exopod and endopod of uropod white. Cornea well pigmented, black. Antennal peduncles and flagella pinkish.

Distribution. Japan: Sagami Bay (Fukuda 1909, 1910; Komai 1938), off Owase (Komai 1927); Tosa Bay, (Ingle and Merrett 1971). Madagascar: 18° 54′S. 43° 55′E (Manning and Struhsaker 1976). Mocambique: 25° 12′S 34° 04′E (Ingle and Merrett 1971). South Africa: north of Durban, Natal (Calman 1923; Gordon 1929), Durban, 29°42′S 31° 29′E (von Bonde 1932, Barnard, 1950). Philippines: off Luzon, 13° 49.4′N 120° 04.2′E; 14° 00.0′N 120° 12.9′E (Moosa 1985).

Bathysquilla microps (Manning)
(Figs 1 D-F, 5, Frontispiece B)

Lysiosquilla microps Manning, 1961: 693-696, Fig. 5, Pls 10-11.

Bathysquilla microps — Manning 1969: 95-99, Figs 26-28; Manning and Struksaker 1976; 443-408, Figs 1 d-f, 2; Moosa 1985 (1986): 371-373, Fig. 1.

Material. — 1♂, QM W15314, Stn. 14/1, 17° 49.45′S 148° 39.51′E, 990-1006m, F.V. 'Franklin', 5°C, beam trawl, 8 v 1986.

Description. The following are additions to the previously published descriptions.

In profile, tip of rostrum down-curved, ventrally concave. Protopodite of antenna with ventral and lateral papillae. Dactyl of second maxilliped with 13 spines on each side, proximal spine being quite small; propod with 14 and 13 large medial spines on right and left sides, with 32 and 35 minor spines along lateral margins, with 12 and 10 proximal spines being small, forming continuous row, larger spines grouped opposite spaces between larger medial spines. Protopod of uropod without ventrolateral tooth; proximal segment of exopod with 7 (right) and 6 (left) graduated mobile spines laterally.

Receptaculum seminis on sixth thoracic sternite with thick well developed anterior triangular median plate, about 2 times longer than deep, well calcified anteriorly and ventrolaterally, soft ventromedially, swollen, with small ventral apical papilla; posteriorly with transverse median prominence bearing short, paired processes, strongly bowed, well calcified anteriorly, feebly calcified posteromedially. Telson with very distinct lateral carinae.

Colouration. Dense crimson red, including most spines and setae; antennular peduncles pale, pinkish; raptorial claw propodal spines distally pale; cornea white.

Measurements. See Table 1.

Distribution. (Fig. 5) Reported from several localities on the Caribbean region, Surinam and French Guiana (Manning and Struhsaker 1976). In the Indo-West Pacific region, first reported from Hawaii (Manning & Struksaker, 1976) and subsequently from the Philippines (Moosa 1985), off Luzon, 13° 49.1′N 119° 59.8′E. and 13° 53.7′N 119° 58.5′E.

Table 1. Measurements (mm) of *Bathysquilla* spp. from the Coral Sea.

Parameter	*B. crassispinosa* ♂	*B. crassispinosa* ♀	*B. microps* ♂
Total body length	142	213	187
Carapace length	26	34	36
Carapace width	26	39	38.5
Rostral length	13	16	6
Rostral width	9	11.5	8.5
First abdominal segment length	11.5	16	15.5
First abdominal segment width	34	47.5	46.5
Telson length	25	29.5	33.5
Telson width	35	47	49
Antennular peduncle length	17.5	25	32.2
Antennal scale length	24.5	33.5	38.5
Corneal width	6.8	7.8	5.6
Corneal depth	2.9	4.0	1.9
Corneal index	382	435	642
Second maxilliped, dactyl length	34	44	45
Second maxilliped, dactyl width (central)	4.5	4.5	5.0
Uropod, proximal exopod segment length	11.5	15	15.5
Uropod, distal exopod segment length	10.5	13	15

DISCUSSION

The mouthparts of most stomatopods, with the exception of the raptorial second maxilliped, have not been described. The mouthparts of six stomatopod genera, *Alima* Leach, *Oratosquilla* Manning, *Harpiosquilla* Holthuis, *Anchistisquilla* Manning, *Odontodactylus* Bigelow and *Gonodactylus* Berthold, now placed in four different stomatopod families, have been described in detail by Kunze (1981) and can be readily compared with those of *Bathysquilla crassipinosa*. Prior to this report, figures of most of the mouth-

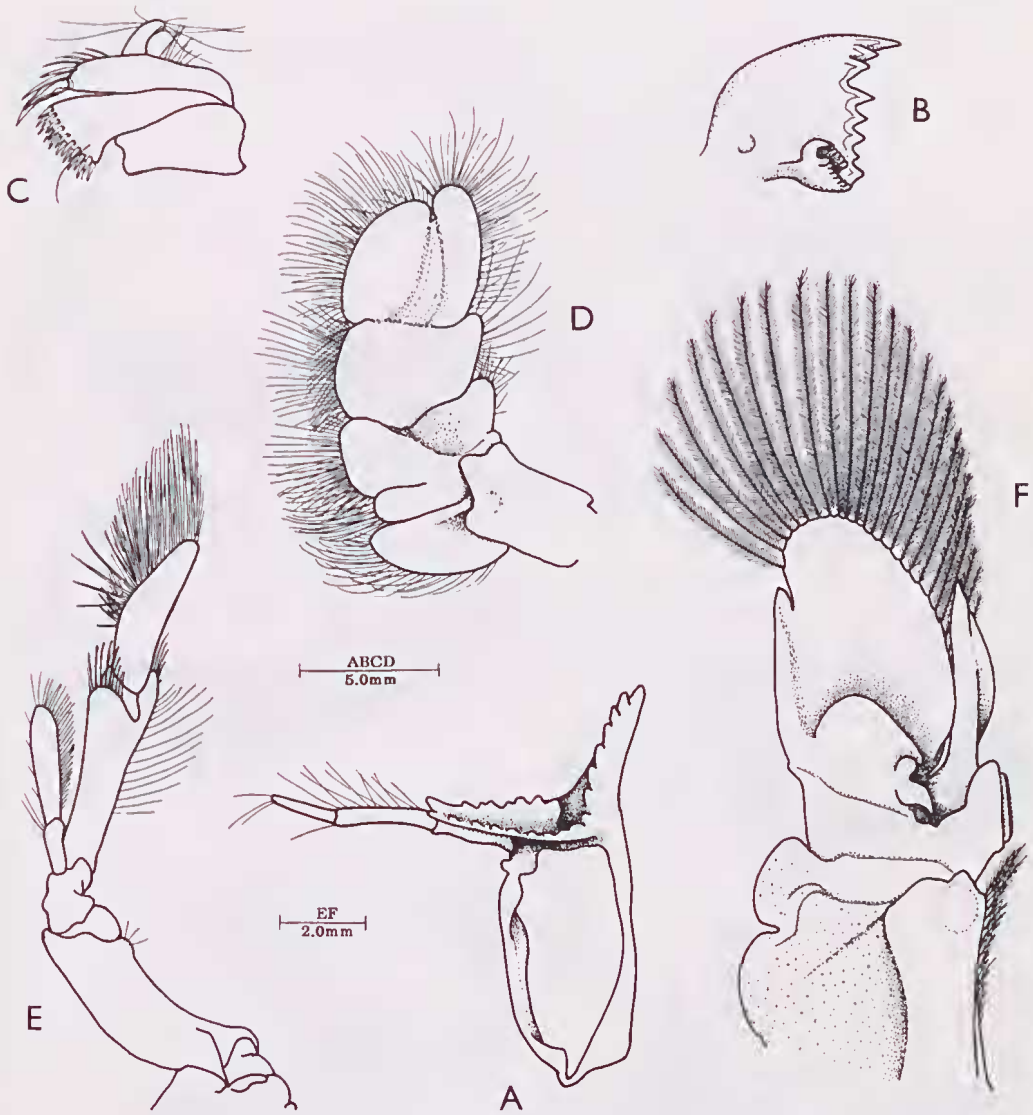

Fig. 2. *Bathysquilla crassispinosa* ♀ (except F): **A,** mandible; **B,** same, incisor process; **C,** maxillula; **D,** maxilla; **E,** sixth thoracopod; **F,** ♂, first pleopod, endopod.

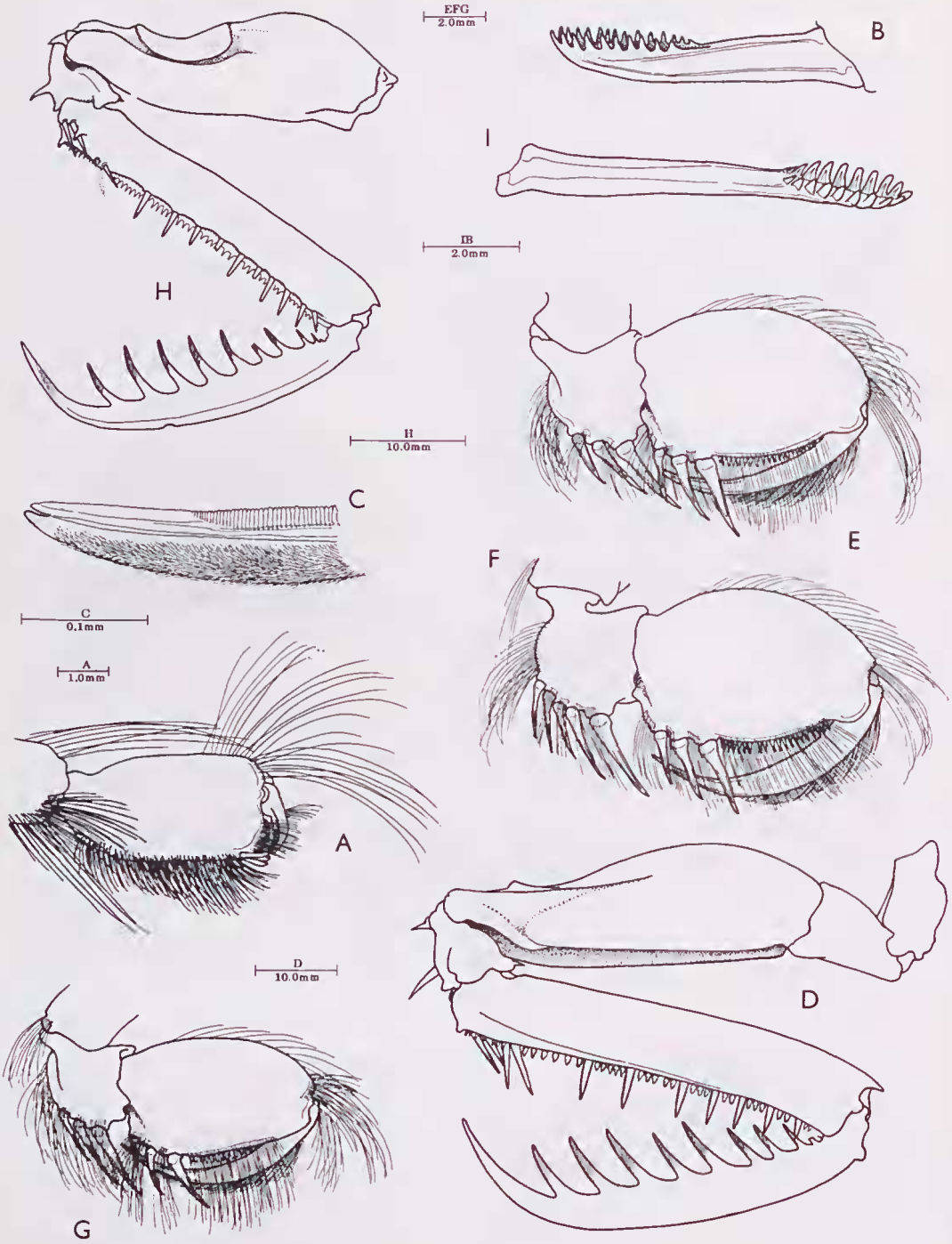

Fig. 3. A-H, *Bathysquilla crassispinosa* ♂ (except **H**): **A,** first maxilliped, chela; **B,** same, distoventral propodal spine; **C,** same, ventral palmar seta, tip only; **D,** second maxilliped, lateral; **E,** third maxilliped, carpus and chela; **F,** fourth maxilliped; **G,** fifth maxilliped, same; **H,** second maxilliped, ♀ , medial; **I,** *Harpiosquilla stephensoni* ♂, first maxilliped, ventral propodal spine.

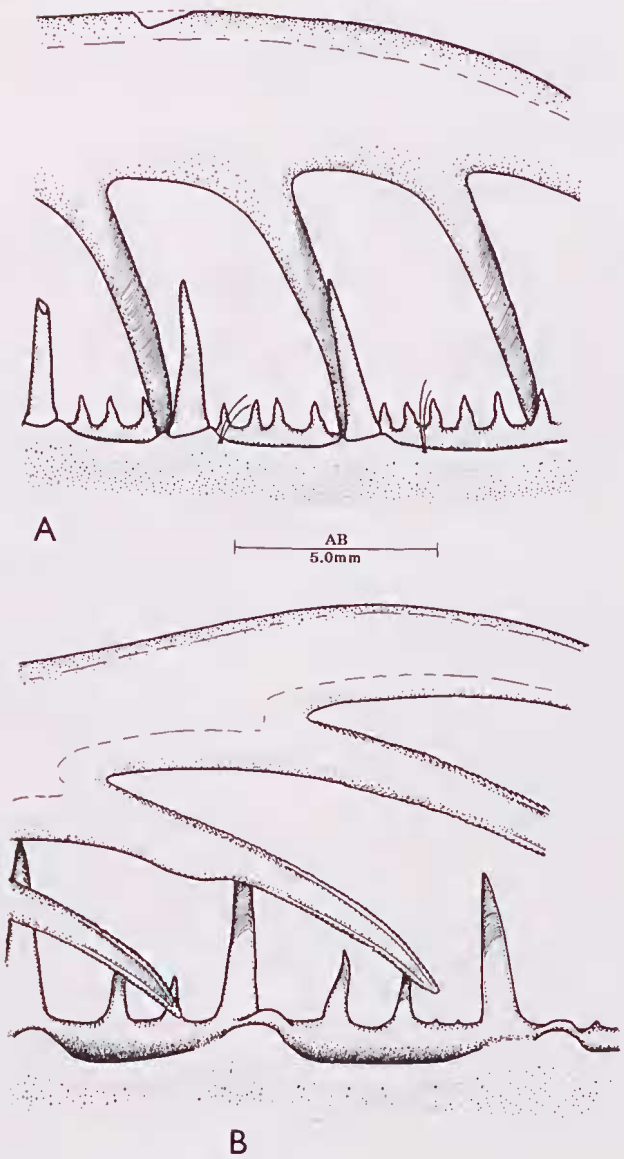

Fig. 4. A, *Bathysquilla crassispinosa* ♀ , second maxilliped, dactylar and prododal spines; **B.** *Harpiosquilla stephensoni* ♀ , second maxilliped, dactylar and propodal spines.

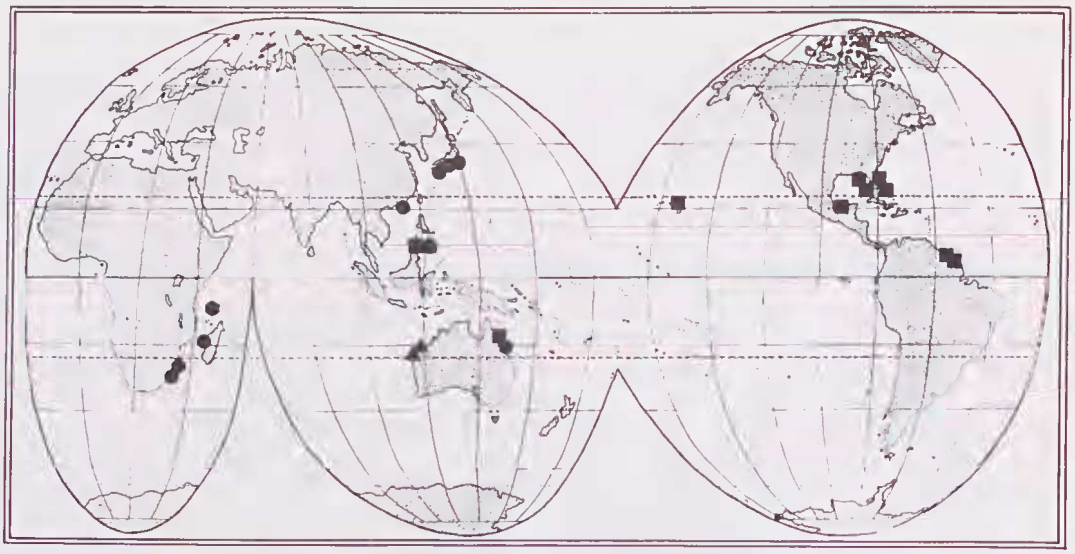

Fig. 5. Distribution of four species of Bathysquillidae: ▲, *Altosquilla soelae* ●, *Indosquilla manihinei* ●, *Bathysquilla crassipinosa*; ■, *B. microps*.

parts of *Pseudosquilla* Dana (Pseudosquillidae) and *Lysiosquilla* Dana (Lysiosquillidae) were also provided by Townsley (1953). The mouthparts of the bathysquillid species, *Indosquilla manihinei* Ingle and Merrett, 1971, have not been described and only the mandible, first and second maxillae have been described and illustrated for *Altosquilla soelae* Bruce, 1985. Comparison with these descriptions indicates that *Bathysquilla* shows the closest resemblance, in its mouthparts, to those of *Harpiosquilla*, in the family Harpiosquillidae.

The mandibles are essentially similar in *Bathysquilla* and *Harpiosquilla*, and may, for convenience, be compared with those of *H. stephensoni* Manning 1969. The mandibular palp in *Bathysquilla* is slightly less setose than in *Harpiosquilla* and the incisor and molar process less robust. The maxillula has a more stoutly developed palp, with longer simple setae, the distal endite has three stout, articulated spines distally instead of two, with four spiniform setae proximally, and the expanded distal margin of the proximal endite has three rows of short spines, whereas in *Harpiosquilla* the palp is short, with two short setae only, the upper lacinia has a stout ankylosed distal spine, distodorsal spiniform seta, and three proximal simple setae; the lower lacinia more expanded, with more numerous, more slender spines. The maxilla in *Bathysquilla* is generally broader than in *Harpiosquilla* but with basically similar segmentation and setation. The first maxilliped of *Bathysquilla* has the subchela only slightly modified, without an expanded ventral portion and a flexed normal position as occurs in *Harpiosquilla*, the dactyl has only a short dorsal seta tuft and is ventrally concave, opposing onto an obsolete cutting edge with a row of short spines, with dense short simple seta laterally and three distally dentate spines only, the ventral palm densely covered with numerous specialized setae. In *Harpiosquilla*, the subchela is little longer than broad, strongly curved and with the posteroventral palm expanded, the dorsal surface of the dactylus densely setose and the ventral aspect is not concave, opposing into a long raised carina, with rows of setae medially and laterally, and the posteroventral region of the palm is densely provided with a mass of distally dentate setae. The second maxilliped in *Harpiosquilla* has the teeth more strongly compressed, with the edges finely serrated, the medial and lateral aspects being finely milled; the propod has only one row of fixed spines, situated medially, the long and short erect spines being in the same row, with a row of deep pits laterally into which the spines of the propod rest. In *Bathysquilla* the edges of the propodal spines are not serrated and the propodal spines are in two distinct rows,

separated by shallow pits which will house the tips of the propodal spines, with the long spines in the medial row and the short spines laterally. The proximal propod is also armed with three long mobile spines in *Harpiosquilla* and four in *Bathysquilla*. In the third to fifth maxillipeds (M), the propodal and carpal spinulation is as follows:

	Bathysquilla			*Harpiosquilla*		
	Mxp.3	Mxp.4	Mxp.5	Mxp.3	Mxp.4	Mxp.5
proximal palmar	3	3	3	3	3	3
medial palmar	3	3	3	0	1	1
ventral carpal	5	3	3	2	2	2
medial carpal	0	0	0	2	1	0

The chela of the fifth maxilliped in *Harpiosquilla* is more subrectangular than oval, as in *Bathysquilla,* with a dense tuft of short setae along the distal margin, where only a few long setae are present in *Bathysquilla.*

The present records of *Bathysquilla* species provide a considerable extension to the known distribution ranges for bathysquillid stomatopods. Although, as yet, records of these species are widely separated, it begins to look as though their disjunct distribution may be more apparent than real and that further collections from appropriate depths and on suitable substrates, on which little information is available, may indicate a much less irregular distribution pattern.

The genus *Bathysquilla* is of considerable antiquity and *B. wetherelli* (Woodward, 1879) is known from Lower Eocene strata in southern England (Quayle 1987).

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